WPS0568

Policy, Research, and External Affairs

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Agricultural Policies

Agriculture and Rural Development
Department
The World Bank
January 1991
WPS 568

Higher Wages for Relief Work Can Make Many of the Poor Worse Off

Recent Evidence from Maharashtra's "Employment Guarantee Scheme"

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Guaranteed employment can be valuable insurance against poverty. But the recent experience in Maharashtra suggests that raising the wage rate when you don't have the budget to pay for it is not in the interests of all the poor. Some get higher pay, but others must go without relief work.

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This paper — a product of the Agricultural Policies Division, Agriculture and Rural Development Department — is part of a larger effort in PRE to research the performance of poverty alleviation schemes and the implications for policy design. Copies are available free from the World Bank, 1818 H Street NW, Washington DC 20433. Please contact Cicely Spooner, room N8-039, extension 30464 (36 pages).

Relief work schemes provide well-targeted relief to poor people, and valuable insurance against poverty. But their success may depend on the scheme's design — particularly the wage rate and coverage offered.

The most famous and one of the most successful of these programs is the Employment Guarantee Scheme (EGS) that has been in operation since the mid-1970s in the Indian state of Maharashtra. In a typical year it provides about 100 million person-days of unskilled employment on rural infrastructure projects, at an average cost of about one dollar a day in the late 1980s. The demand for EGS work fluctuates enormously from year to year (depending on the vagaries of the monsoon) and across seasons in a given year.

In mid-1988 the piece rates paid to workers on EGS doubled, in line with new statutory minimum wage rates for agricultural labor. Ravallion, Datt, and Chaudhuri investigated the effects of this sudden increase on the scheme's cost, the workers' wages, and their ability to find work when needed.

They found that the impact of the wage increase on real cost was dampened by inflation, adjustments in the composition of work, and, most important, by falling employment. The aggregate real cost per month fell after the increase in wage rates. This partly reflected good monsoons but, controlling for monsoons, there are signs that falling employment reflected rationing; some poor people who wanted relief work could not get it.

Ravallion, Datt, and Chaudhuri found that EGS met less than half of the demand for work after the wage increase and that almost all of the fall in EGS employment was from rationing. The effects of the initial wage increase on the poor are ambiguous: some could get higher wages but others went without desired relief work.

The concept of assured employment, albeit at a low wage, can be attractive in terms of poverty alleviation: it generally allows scarce resources to go to the poorest first (at least those able to work), it maximizes the insurance benefits to the poor, and it helps undermine some of the possibilities for corruption on such schemes — and for exploitation in labor markets and tenancy contracts.

But achieving these benefits with limited budgetary resources requires a low enough wage rate. The recent experience in Maharashtra suggests that imposing a higher wage rate when you don't have the budget to pay for it is not in the interests of all of the poor.

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* The authors are grateful to the Government of Maharashtra for providing generous access to their records on the "Employment Guarantee Scheme" and related data, and to Seema Arora for able research assistance. For their comments on this paper, our thanks go to Roger Slade and Dominique van de Walle. This research has been supported by the World Bank's Research Committee under RPO 675-96.

1. Introduction

Amongst developing countries, the "Employment Guarantee Scheme" (EGS) in the state of Maharashtra in India is probably the most famous and, by many accounts, the most successful direct governmental effort at reducing absolute poverty in rural areas.[1] Since the mid-1970s, EGS has aimed to offer unskilled rural employment on demand, as embodied in its slogan, "magel tyala kam" ("whoever desires work will get it"). The work creates or maintains rural infrastructure, through small scale irrigation and soil conservation projects, re-forestation, and rural road building. EGS projects are designed to be highly intensive in their use of un-skilled labor, which typically accounts for over two-thirds of variable costs. Wages are set in the form of piece rates, stipulating rates of pay for a large number of specific tasks, such as digging, breaking rocks, shifting earth, and transplanting.

The scale of the scheme is impressive; in a typical year, it provides about 100 million person-days of employment. (The state's aggregate rural workforce - including cultivators - was about 20 million persons in the mid-1980s.) Given this scale, it is surprising how little we seem to know about the scheme's performance in alleviating income poverty. But the little we do know suggests that the scheme is well targeted, in that the non-poor are rarely attracted, and that the net transfer and income stabilization benefits to the poor are likely to be quite sizable.[2]

To many observers, the "employment guarantee" built into the Maharashtra scheme has been an important factor in realizing those benefits. With adequate (though still limited) budgetary resources, the combination of an employment guarantee and a wage rate low enough to balance the budget in an average year is likely to be the policy which will have the greatest impact on measures of poverty which give highest weight to the poorest (Basu, 1981; Ravallion, 1990a).[3]

Until recently, the piece rates have been such that a typical EGS worker could earn wages roughly on par with prevailing agricultural wages. However, in May 1988 the piece rates paid by the EGS doubled, following a doubling in statutory minimum wage rates. Serious concerns have been expressed about the budgetary consequences of this substantial increase in the EGS wage (Subbarao, 1989; World Bank, 1989). The potential impact on cost would naturally create pressure to relax the employment "guarantee". Providing higher wages without the guarantee will mean that, although the actual participants are made better off, fewer of the poor will be able to become participants. High wages rates (relative to prevailing rates in agriculture) throw into doubt both the fiscal sustainability and the social desirability of an employment guarantee (Ravallion, 1990b).

The existing evidence on effects of the wage increase is inconclusive. Some observers have suggested that an unfulfilled demand for EGS work by the poor emerged. There were reports of un-seasonal migration into urban areas of Maharashtra in 1988/89, attributed to problems in finding EGS work in rural areas.[4] Average attendances on EGS did fall after mid-1988. However, the crop-years following the wage increase were amongst the best in recent times, and this may equally well explain the falling attendances. During May 1990, the first two authors raised the issue in a few informal interviews with administrators and workers on EGS, and other interested parties. There was no obvious sign of a consensus on how the wage increase affected the scheme; "good monsoons since then" was easily as popular an explanation as "EGS work unavailable".

This paper investigates the effects on the scheme of the dramatic change in the EGS wage schedule in mid-1988. Three questions are addressed:

i) What happened to EGS employment, wage rates, and the cost of the scheme to the government after the increase in the statutory minimum wage rate? Section 2 describes how the main variables of interest have evolved.

ii) What determines EGS employment, and did this change as a result of the wage increase? Section 3 examines this question using an econometric model of the monthly attendance count on EGS from 1975 to 1988. An estimate is then made of the extent of work rationing on EGS during the 12 months after the wage increase.

ii) Does the EGS now "guarantee" employment, in the sense that workers can find local employment when they want it, at the going EGS wages? We address this question using new data on the scheme for 1987/90 in Section 4.

2. Maharashtra's "Employment Guarantee Scheme" Before and After May 1988.

We shall first look closely at the period April 1987 to February 1990, for which we have monthly data on a number of key variables.[5] This will motivate our interest in the more analytical questions addressed in sections 3 and 4.

One can usefully divide the period into three sub-periods: **Sub-period 1**: Pre-May 1988, during which the average wage rate on EGS was approximately equal to the agricultural wage rate. **Sub-period 2**: June 1988 to November 1988, during which there were some significant adjustments in the scheme, as will be discussed below. **Sub-period 3**: The period since December 1988 in which, we shall argue, the scheme appears to have settled into a new "equilibrium". The three sub-periods are identified in Figure 1, which plots the average real wage rate for EGS employees over the period April 1987 to February 1990, as well as our estimate of the average wage rate for agriculture, which we will discuss further in section 4.

The adjustment period saw the EGS wage roughly double initially, in line with the increase in the statutory minimum wage rate. The wage rate then fell almost as dramatically, to end up at about one third higher (in real terms) than it had been prior to May 1988 (Figure 1).

Inflation contributed to this decline, but there are other factors to consider. Wage rates on the EGS are fixed according to the type of work done and its output; for example, rock breaking is paid at a different rate per cubic foot to loading soil on trucks. The whole piece rate schedule doubled after May 1988. The allocation of the available work across these activities - which we will refer to as the <u>composition</u> of EGS work - is determined by the EGS authorities, through their project choices. Under such conditions it may be quite sensible for the authorities to adjust the latter in favor of activities with lower piece rates, in response to the increase in the wage schedule.[6]

Given that such adjustments are not instantaneous, a better indication of how the scheme responded to the change in wage schedule can be obtained by comparing outcomes across periods 1 and 3. Table 1 gives some data of interest for all three sub-periods, calculated from unpublished monthly EGS records.

By the third sub-period, the impact of doubling the piece rate schedule amounted to about a one-third increase in the average real EGS wage rate; roughly two-thirds of the initial wage increase was absorbed through inflation and changes in work composition. But the more striking observation is that, despite the net real wage increase, employment actually fell, and by a similar proportion to the increase in the average wage.[7] Comparing sub-periods 1 and 3, unit non-wage cost remained fairly constant in real terms. On balance, the average real monthly cost of running the scheme fell by about one-fifth after the doubling of piece rates in May 1988.

A decomposition formula can be used to throw further light on the relative importance of these various factors - wage rates, non-wage costs, and employment - in determining the scheme's operating cost. Let C_t denote the total operating cost of EGS in month t, which can be written as $C_t = V_t L_t$ where V_t is unit real cost per worker and L_t is the number of workers employed in month t. Unit cost can be written as $V_t = W_t + X_t$ where W_t denotes average real wage cost per worker and X_t denotes average real non-wage cost. The value of W_t depends on the current purchasing power of the stipulated nominal piece rate schedule, and on the allocation of available work across the various piece rate categories at date t. The piece rate schedule is tied to the statutory minimum wage rate for agricultural labor, m_t (in nominal units), for some pre-determined allocation of work across piece rate categories. If that is also the allocation at date t then $W_t = m_t/p_t$ where p_t denotes the price deflator for date t. More generally $W_t = k_t m_t/p_t$, and a change in k will be referred as a change in "work composition" (relative to the date when the piece rate schedule was fixed). We consider two dates t = 1 (sub-period 1) and t = 3 (sub-period 3), and we know that $m_3 = 2m_1$. The change in monthly operating cost between sub-period 1 and 3 and its decomposition is then given in Table 2.

Both inflation and (more importantly) the change in work composition were important in holding down real costs after the increase in the minimum wage. However, the overwhelming term in the decomposition is the cost saving due to the decrease in employment; if nothing else had changed, the saving due to the drop in employment would have eliminated about 60% of the initial impact of the doubling of the minimum wage rate (Table 2). Following sections will try to better understand this fall in employment.

3. Did the Process of Employment Determination Change Significantly?

We shall now look as far back into the history of the scheme as data permit, to better understand the determinants of employment. Section 3.1 presents a model of EGS attendances prior to mid-1988, which section 3.2 will use to perform statistical tests for drift in EGS employment after the wage increase. Section 3.3 will use the model to estimate the extent of employment rationing in the 12 months following the wage increase.

3.1 A Model of Monthly Attendances on the EGS, 1975-1988

The data on monthly person-days of employment on EGS used in the previous section are only available since April 1987. We need to go much further back in time to convincingly test for a structural change in the model determining employment after mid-1988. Fortunately, while a long time series of employment in person-days is not available, the Government of Maharashtra has kept a regular attendance count at EGS project sites since July 1975. And this is probably a good proxy for employment.[8]

We assume that monthly EGS attendances are determined by the current EGS wage rate, foodgrain output in the current year, the level and pattern of rainfall, seasonal dummy variables, and a time trend, included to allow for any time dependent omitted variables. We shall also allow the possibility that EGS attendances in a given month do not adjust instantaneously to the current values of these variables. Serial correlation in attendances can arise in a number of ways. For example, changes in agricultural output may have lagged effects on income of the poor and, hence, their demand for relief work. Under certain conditions (notably that the lags can be smoothed exponentially), simply adding lagged attendances to the model will adequately capture such lagged effects of the explanatory variables. The fortnightly payment period used by the EGS may also generate some "stickiness" in the adjustment of employment to changing conditions. It can also be conjectured that the attendance count will tend to be more serially correlated than person-days of employment.

Labor attendance data are available on a monthly basis for the 14-year period spanning July 1975 through June 1989.[9] However, only annual data on the EGS time wage are available for this period; the time wage is measured as the average wage per person day for the EGS financial year April through March. Thus we have had to use the same value of the wage variable for the months April through March. The nominal wage rates were deflated by the Consumer Price Index for Agricultural Laborers for Maharashtra to obtain real EGS wages at 1975/76 prices.

Data on output of foodgrains pertain to the agricultural year July to June,[10] and (as for the EGS real wage) the foodgrain output variable takes on the same value over these months. Foodgrain output is of course observed only at the end of the agricultural year, and it may appear odd to use it to explain EGS attendances for the earlier months (of the agricultural year). However, it seems plausible that, insofar as EGS attendances in the earlier months depend on the level of agricultural activity in those months, the conditions determining the latter (e.g. adequate and timely rainfall in the monsoon period) would also be reflected in the agricultural output for the entire year.[11]

Monthly data on rainfall for four meteorological sub-divisions in Maharashtra were collated from various issues of the Statistical Abstract of India and the Agricultural Situation in India. Rainfall for Maharashtra is derived as a weighted average of the rainfall in the four sub-divisions, the weights being proportional to the average net sown areas in the sub-divisions during 1978/79 to 1980/81 (GOM, 1984). The effect of rainfall on monthly EGS labor attendance, although potentially significant, need not be straightforward. The rainfall effect would presumably be seasonally differentiated, depending on whether there is deficit or excess rainfall, and on the amount of deficit or excess. We thus use a fairly flexible approach in introducing the rainfall variables, by defining the following "rainfall excess" (RE) and "rainfall deficit" (RD) variables:

$$RE_j = M_j.DE.(R - NR)/NR \qquad j = 1,...12$$

$$RD_j = M_j.(1 - DE).(NR - R)/NR \qquad j = 1,...12$$

where M_j is a dummy variable for month j, DE is a dummy variable for excess rainfall (equals one if there is excess rain, zero otherwise), R and NR are the actual and normal rainfall respectively. The normal rainfall for any month is defined as the average rainfall for that month over the entire 13-year period 1975/76 to 1988/89.

The wage rate in agriculture is probably the most important omitted variable in our model. We considered including the annual agricultural wage series available from Agricultural Wages in India (AWI). However, these are currently only available up to 1986/7, so if we used that data as an independent variable in the model we would have missing values to deal with for the last two years, and we would have to forecast the series for 1988/89, prior to forecasting attendances. This creates complications, and it is probably better to give our model a reduced form interpretation, in which an equation for the agricultural wage rate has been "solved out". Monthly agricultural wage data for Maharashtra over the last few years are available from a different source (though their comparability with AWI data is unclear). These are reported in Figure 1 and are used in section 4. They do not suggest that the drop in EGS attendances after mid-1988 could plausibly be attributed to an increase in the agricultural wage rate, which remained fairly constant. Our later inferences based on the post-sample forecasts are likely to be robust to the omission of agricultural wages from our model.

Our model of EGS labor attendances can be written as

$$L_t = \alpha_0 + \alpha_1 L_{t-1} + \alpha_2 W_t + \alpha_3 Q_t + \alpha_4 t + \sum_{j=1}^{11} \beta_j M_{jt} + \sum_{j=1}^{12} (\tau_j RE_{jt} + \delta_j RD_{jt}) + \epsilon_t \quad (1)$$

where L_t is the recorded labor attendance on EGS for month t, W_t is the real EGS wage rate for the year including month t, Q_t is the output of foodgrains for that crop year, M_js are the monthly dummy variables for j=1,...11 (j=1 represents July), t is a time trend, RE_j and RD_j are the month-specific excess and deficit rainfall variables (as defined above) respectively for j=1,...12, and ϵ_t is an i.i.d. error term. L_t, W_t. and Q_t are measured in natural logarithms. The above model was estimated by ordinary least squares over the period July 1975 to June 1988.[12 13] After pruning the model to eliminate parameters with absolute t-ratios less than unity (one variable at a time), the final estimates presented in Table 3 were obtained. The within sample predictive performance of the model is good; the standard error of estimate is less than 1% of the mean log attendance, and fitted values track actual values well (Figure 2). The model passed all diagnostic tests performed (Table 3).

The parameter estimates indicate significant short-run elasticities of EGS attendances with respect to foodgrain production and the real EGS wage rate of -0.28 and 0.20 respectively. The dynamic process of adjustment in attendances to changing conditions is quite slow, as indicated by the coefficient on lagged attendances of 0.8. Thus, the long-run elasticities for output and the real wage are considerably higher than for the short-run; the long-run elasticities are -1.4 and 1.0 respectively. A negative time trend in attendances is indicated, although it is quantitatively small, implying a monthly rate of decline of (.07 percent (the latter cumulated over 13 years would result in a fall by 10 percent). Attendances also follow a highly seasonal pattern, induced in part by the observed seasonality of rainfall (Table 3).

3.2 Tests for a Structural Break in the Model After the Wage Increase

The results of Table 3 suggest that, *ceteris paribus*, labor attendances on EGS would have increased in response to the higher wage after mid-1988. However, attendances actually declined sharply during the agricultural year 1988/89 (Figure 2). The average monthly attendance during 1988/89 was barely half of what it was during the previous year, which itself was not, by a long shot, a peak EGS year. An explanation may be sought in the higher than normal rainfall during 1988/89 (also reflected in the foodgrains production for that year), resulting in greater availability of agricultural employment. The critical issue here is whether this explanation is sufficient to account for the observed levels of attendance on EGS for this period. Does the above model adequately explain the decline in attendances after the wage increase, taking account of the prevailing conditions?

We performed two statistical tests of the accuracy of the model's predictions in the post-sample period, July 1988 to June 1989.[14] [15] The first involves estimating a new model for the entire (sample and post-sample) period, where the original model is augmented with a set of dummy variables, one for each observation in the post-sample period, and then testing for the joint significance of the dummy variables (Pesaran and Pesaran, 1987). The second test uses the ratio of the sum of squares of the one-step ahead forecast errors to the variance of the regression error of the model as the test statistic, which is distributed as Chi-square with degrees of freedom given by the length of the forecast period (Granger and Newbold, 1986).

The results of the two tests are reported at the bottom of Table 3. They both indicate that the null hypothesis of parameter stability is strongly rejected for the post-sample period July 1988 to June 1989. The attendance count for the latter period cannot plausibly have been generated by the model prevailing prior to the wage increase.[16]

3.3 An Estimate of the Extent of Rationing After the Wage Increase

The drift in the attendance model after the wage increase is statistically significant. We shall now offer an assessment of its quantitative importance. We shall assume that the model we have estimated for 1975-88 satisfactorily represents the notional demand function for EGS work.

This could be a strong assumption, for there may well have been some rationing in the earlier period as well.[17] To the extent that this assumption does not hold, we will under-estimate the extent of rationing in recent years. However, the results we have obtained for 1975-88 are at least consistent with what we would expect to find for a notional demand schedule (and quite unlike those we have obtained for recent years, as we shall discuss later).

Under this assumption, we can use the 1975-88 model to estimate the latent notional demand for EGS work in the 12 months after the wage increase. This can then be compared to actual employment, to estimate the extent of rationing after the wage increase. Figure 2 gives the forecasted attendance counts for the post-sample period. Note that these are dynamic forecasts using the lagged forecasts (rather than lagged actual attendances).[18] That is appropriate, since we want to know what attendances we would have expected if there had been no rationing in the post-sample period.

The forecasts indicate a sharp fall in attendances immediately after June 1988, but not as large as that actually observed. Substantially higher attendances are predicted by the model, and the deviation between forecast and actual attendance continues to increase well into the crop year. Table 4 gives the estimated employment rationing by month.

The mean predicted attendance for the post-sample period is 491,269 per month. The mean actual attendance was 212,840. We thus estimate that almost 280,000 persons per month - about 3.3 million for the whole year - desired EGS employment in 1988/89 but could not get it. The amount of rationing increased steadily after the wage increase, peaking in March 1989 (Table 4).

How much of the observed decline in attendances after the wage increase is attributable to this rationing, rather than other factors, such as the good monsoon of that year? The mean monthly attendance at EGS in the sample period, 1975-88, was 534,974 persons. The decrease in 1988/89 was thus 322,134, of which 86% is attributable to rationing.

4. Does the EGS Now Guarantee Employment?

The above results suggest that the higher minimum wage was associated with a significant change in the way employment on EGS is determined. We shall now return to the 1987/90 period, to see if the recent data are consistent with the existence of rationing. Two tests will be performed: the first uses information on works in progress, while the second uses information on agricultural wage rates. For both, we have a data set of a little over 33 months, though 14 months are in sub-period 1, prior to the wage increase. Rather than drop this period, we have retained the full 33 observations. Since rationing is less likely in sub-period 1, its inclusion will probably bias our tests toward accepting the null hypothesis of no rationing.

4.1 The Effect of the Number of Works in Progress on Employment

Demand for EGS work will generally depend on the wage schedule, the type of work available, work-leisure preferences, other wages and prices, and alternative earning opportunities. However, it will also depend on the accessibility of the available work. The demand for work at a long distance from home is presumably small, and it would be unsurprising to find that this demand is easily met by the scheme. Here we shall ask whether employment is available to accommodate the notional demand for local employment, for which travel costs (pecuniary or non-pecuniary) are negligible. This is consistent with the spirit of EGS; since its inception, the scheme has aimed to provide work within reasonable walking distance of home. However, it may still be a somewhat stronger form of "guarantee" than is intended by the government, as the legislation does not assure that travel costs will be negligible.

The motivation for our test can best be understood by noting that the number of EGS projects should <u>not</u> affect the notional demand for local EGS work, ceteris paribus. If the scheme is truly successful in providing guaranteed local employment, then the number of projects, and attendances at the given projects, will adjust flexibly to accommodate the notional demand for work. An extra project, for example, would simply displace employment elsewhere; the aggregate would remain unchanged, unless other conditions facing workers have changed.

The null hypothesis of guaranteed local employment can thus be interpreted as the hypothesis that the observed monthly employment on EGS equals the unobserved notional demand for EGS employment at zero travel cost. It then follows that, under the null, L should not be influenced by the number of EGS works in progress during the same month (denoted P).

The simplest testing procedure is as follows: Regress L_t on P_t and on other variables which, a priori, might be expected to influence L_t. A significant estimate of the coefficient on P_t implies rejection of the null, subject to the usual caveat that the estimate be consistent.

We thus estimate the following test equation:

$$L_t = b_0 + b_1 L_{t-1} + b_2 W_t + b_3 WA_t + \underline{M}_t \underline{b}_4' + b_5 P_t + u_t \qquad (2)$$

where L_t is observed person-days of employment on EGS for month t, W_t is the average daily wage paid to laborers on EGS sites in that month, WA_t is the reported daily wage in agriculture for month t, M_t is a set of monthly dummies, P_t is the number of works in progress in month t, and u_t is an i.i.d. disturbance term.[19] The lagged dependent variable was included to preclude a spurious estimate of b_5 as a result of serial correlation in both the L and P series. One would generally expect that the notional demand for EGS employment depends positively on W. Since agricultural employment is an alternative to EGS employment, we would expect L to depend negatively on WA under the null. And the monthly dummies are included to capture the seasonal nature of agricultural activity.

Since April 1987, EGS authorities have been keeping more detailed monthly records of employment, wages paid, and works in progress. Our employment data after April 1987 will be estimates of actual person-days of employment, rather than attendances, as were used in the previous section. At the time this study began, these data were available for the period from April, 1987 to February, 1990. For the period up to December 1989 monthly data on agricultural wage rates were also available from the Director of Economics and Statistics, Government of Maharashtra.[20]

OLS estimates of the parameters of interest are given in Column 1 of Table 5. The estimated coefficient on P is positive and significant. The estimate of the coefficient on W is significant, but does not have the sign one would expect of the notional demand function for EGS work. The elasticity w.r.t. the agricultural wage rate is not significantly different from zero.

While these results are suggestive of rationing, they do not warrant an immediate rejection of the null. There may be sources of bias in the OLS estimates which would invalidate any inference based on them.

A necessary condition for the consistency of OLS estimates is that all the regressors be exogenous. This includes P. Under the null, exogeneity of P would necessarily imply that the costs of access to EGS projects are negligible. Only then would a full accommodation of the demand for employment in all periods be consistent with an exogenously given number of projects. This seems unlikely. A more plausible assumption is that P is responsive to the notional demand for work in the current period and hence, under the null, to L. Thus, there is reason to suspect the presence of simultaneity bias in the OLS estimates.

We correct for the possible bias by instrumenting for P_t. The natural instrument is P_{t-1}. Possible additional instruments are the lagged values of L, W, and WA.[21] With these instruments for P_t, we obtained the IV estimates given in Column 2 of Table 5. Column 3 gives the slightly more precise estimates obtainable by deleting strongly insignificant variables from equation (2). The estimates of b_5 are again highly significant, and the aforementioned comments on the two wage elasticities, b_2 and b_3, continue to hold. Alternative assumptions about the partial adjustment process governing P might suggest somewhat different instruments. While the use of those instruments would affect the efficiency of the estimates, it should not affect their consistency.

The assumptions we make about the processes generating W and WA will also be important. They determine the status of the regressors in (2), which in turn dictates the appropriate estimation procedure. The null hypothesis does not, a priori, imply any restrictions on these processes. So far we have implicitly assumed that W and WA are exogenous. Relaxing this assumption, we estimated (2) instrumenting for W_t and WA_t as well as P_t i.e., these variables were dropped from the set of instruments; a dummy variable to capture the doubling of the EGS wage was added. Again, the IV estimate of the coefficient on P_t was highly significant (with similar results to Table 5), and the wage responses remained inconsistent with what one would expect of a notional demand function.

The other potential source of bias is the possibility of omitted variables. The problem in this instance is somewhat more serious than in most, for the following reason. Even if the omitted variables are uncorrelated with the remaining included variables, given the endogeneity of P_t, they will be correlated with this variable. A significant estimate of the coefficient on P_t may therefore simply reflect the influence of these omitted variables. We have no way of distinguishing this effect from that which would arise from rationing.

Very little can be done about this problem. We attempted to mitigate its effects by adding to equation (2) various potential proximate influences on the notional demand for EGS employment. Among the variables we included were: year dummies, the deviations in rainfall from the mean, monsoon dummies, and various interaction terms. In each case, the instrumental variables estimate of the coefficient on P_t was highly significant.

We cannot eliminate the possibility of omitted variable bias and so we may be incorrectly rejecting the null. Nevertheless, the repeated estimation, under different procedures, of different variants of the test equation failed to yield an insignificant estimate of b_5, or anything that might accord with our intuition about the determinants of the notional demand for EGS employment.

Thus, it is hard to believe that we are observing the notional demand function for local EGS employment. The opening and closing of EGS project sites gives the authorities an effective instrument for influencing EGS employment and, hence, budgetary outlays, independently of the need for EGS employment by the poor.

Unfortunately, we cannot repeat this test for any reasonable length of time prior to May 1988, as the necessary data do not exist. However, given that we found strong evidence in section 3 of a structural break in the model determining EGS attendances after that date, our combined results are consistent with the view that rationing was introduced into EGS in response to the increase in the minimum wage rate. The revealed negative wage elasticity of employment in the above results, in contrast to the expected positive response found in the previous section, is also consistent with this interpretation.

Note that workers need not have been turned away from existing and on-going sites to achieve employment rationing on EGS. The process of opening and closing works allows the scheme to influence employment, irrespective of notional demand. For example, by closing an existing site, the authorities will generally raise the (pecuniary <u>and</u> non-pecuniary) cost the displaced workers incur in participating in the EGS. The way in which employment is rationed across workers may thus be quite complex, involving the various factors which influence effective <u>access</u> to EGS sites, including, for example, the demands on a worker's time at home.

4.2 The Effect on Agricultural Wages.

A second testable implication of the existence of an effective employment guarantee is that one would expect to see a relationship between the EGS wage rate and the agricultural wage rate. The strength of that relationship will depend on specific labor market conditions. Many EGS workers are also regular participants in the agricultural labor market, and vice versa. Furthermore, the work involved appears to be quite similar, as are the hours worked. In these circumstances, with EGS and agricultural wages roughly equal initially, higher EGS wages with guaranteed employment would have to result in higher agricultural wages.

A visual inspection of Figure 1 does not suggest that the agricultural wage rate responded much to changes in the EGS wage rate during this period. Granted the simple correlation coefficient between the two wage rates is high (r=.74). But this is largely a spurious correlation, reflecting the serial correlation of both series;[22] the correlation coefficient is only .32 between the innovations in each series around its first order autoregression. The following dynamic regression performs fairly well in reproducing the agricultural wage series in Figure 1:

$$WA_t = \underset{(1.95)}{2.607} + \underset{(3.66)}{.675}WA_{t-1} + \underset{(2.33)}{.134}W_t - \underset{(1.99)}{.105}W_{t-1} + \text{monthly dummy variables and time trend}$$

R^2=.851; SEE=.347; Mean d.v.=9.34; n=31; LM tests: AR(1)=.41, RESET=1.57, NORM=1.19, HETERO=2.22.

Within the current month, the impact on the agricultural wage rate of a (say) Rp10 increase in the EGS wage rate is Rp1.3. This is substantially off-set by the negative lagged response; by the next month the total impact falls to Rp1.2.

While the short-run agricultural wage response is small, one might still conjecture that there is some sort of long-run equilibrium relationship between the two wage rates. Neither Figure 1 nor the above regression offers much support for that conjecture. The long-run response of the agricultural wage rate to the EGS wage rate implied by the above regression is very much less than unity; a Rp10 increase in the EGS wage rate would result in less than Rp1 increase in the agricultural wage in the long-run. The existence of a long-run equilibrium wage differential can also be assessed by testing for cointegration, using the methodology proposed by Engle and Granger (1987). The wage series in Figure 1 fail the cointegration test; the null hypothesis of no cointegration cannot be convincingly rejected with these data.[23]

Possibly the number of available observations is inadequate for detecting the true long-run response; the power of these tests is questionable in small samples. Nonetheless, the lack of an appreciable short-run or long-run impact on agricultural wage rates casts doubt on any presumption that the "guarantee" has provided a secure fall-back position for agricultural workers. Indirect transfer benefits to the poor from the second-round effects of public employment on agricultural labor markets are potentially large (Ravallion, 1990a,c). But these data do not suggest that the potential has been realized by the EGS, at least over recent years.

5. Conclusions

Increasing the statutory minimum wage rate can seem an attractive policy for politicians keen to enhance their popularity amongst the poor. Political pressure for an increase in the minimum agricultural wage rate in Maharashtra led to its doubling in mid-1988. Subsequently, there has been concern in government circles and the development community about the consequences for the state's famous "Employment Guarantee Scheme". The view one takes of the Maharashtra experience also has implications for the design of other schemes of this sort, such as the proposed national EGS.

Historically, statutory minimum wage rates in rural areas have been virtually impossible to enforce, and the agricultural wage rate has often been below the minimum wage rate. In theory at least, EGS gives the government a policy instrument for enforcing a minimum wage rate, as the guarantee should be a credible threat in the labor market. However, unless the politicians are also willing to foot the bill, the need for budgetary restraint will create pressure for a relaxation of the "guarantee". If so, the poverty alleviation impact of an increase in the minimum wage rate may be quickly dissipated; some will get higher wages, but others will have to go without. Under these circumstances, it is quite possible for poverty - by any reasonable measure - to increase after the imposition of a higher wage rate for relief work (Ravallion, 1990a).

Our comparison of the budgetary aggregates and related statistics on EGS reveals that average monthly expenditures actually fell after the increase in the statutory minimum wage rate. This is attributable to two main factors:

i) After an initial adjustment period of a few months, we find that the real average EGS wage rate increased by only one-third, despite the initial doubling of all nominal piece rates. Inflation helped (and it will continue to do so). However, the more important factor was that the available work on EGS shifted toward activities which are paid at lower piece rates. This allowed considerable "buffering" of the average EGS wage rate from the doubling in the piece rate schedule.

ii) There was a sharp fall in EGS employment after the increase in wage rates. Employment fell by about one-third. However, this alone does not imply that the authorities introduced rationing. There are other variables to consider. The two crop-years after the wage increase were good for agriculture, thanks to excellent and timely monsoons, particularly in 1988/89.

The comparison of aggregate statistics on EGS before and after mid-1988 is thus consistent with rationing, but it is not convincing evidence. Only by careful modelling of the determination of employment on EGS can we hope to answer the question of whether or not the imposition of higher minimum wage rates led to a significant and substantial change in the scheme, whereby an unfulfilled demand for relief work emerged on a large scale.

Our econometric investigations suggest that this is what happened. We have presented three empirical observations to support that conclusion:

i) A model of EGS employment (measured by an attendance count) was estimated on monthly data over 13 years prior to the doubling of the minimum wage rate in mid-1988. The model behaves pretty much as one would expect over this period; EGS attendances respond positively to the EGS wage rate, negatively to foodgrain output, and have the expected response to unusual rainfall patterns and the normal seasonality of agricultural operations. However, this changes markedly after mid-1988. The model predicts substantially higher EGS attendances than those actually observed after the increase in the minimum wage rate, and allowing for the fact that 1988/89 was a good agricultural year. Our results suggest a structural break in the process of employment determination, consistent with the introduction of rationing. Assuming that our model adequately captures the notional demand function for EGS work, we estimate that the EGS met only 43% of that demand in the 12 months after the wage increase. 86% of the difference between mean employment per month in 1988/89 and that for the preceding 13 years was due to rationing; otherwise we would have expected to see an attendance figure some 3.3 million persons higher in 1988/89. We do not know whether there was any systematic pattern in the rationing (whether, for example, it tended to be the poorest participants). An investigation of the spatial pattern of rationing across districts may throw light on this question.

ii) A further test is possible for a three year period up to early 1990 for which we have better employment data and a monthly series on the number of EGS works in progress. For this recent period, we find little evidence to suggest that the observed series of EGS employment can be interpreted as the workers' notional demand for local work on the scheme. The number of works in progress has a sizable and significant effect on EGS employment, which is not what one would expect if the scheme was simply accommodating the notional demand for local EGS employment. Also, unlike the period prior to the increase in minimum wage rates, we find a seemingly perverse response of employment to EGS wage rates. And agricultural wage rates do not appear to have influenced employment on EGS in recent years.

iii) Finally, we investigated the effect on agricultural labor markets. If EGS really was absorbing the excess supply of labor to alternative work then one would expect to see a substantial impact on wages for that work stemming from shifts in EGS wages. However, we find no sign of an equilibrium relationship between the two wage rates. Little more than 10% of an increase in the EGS wage was passed on in the agricultural wage rate in either the short-run or long-run. Rationing of EGS employment appears to have dampened the expected second-round income effects arising through agricultural labor markets.

Whether one deems these changes to have been desirable or not depends crucially on one's judgement of the desirability of an employment guarantee. The concept of assured employment, albeit at a low wage, does have a number of potentially attractive features from the point of view of poverty alleviation: it generally allows scarce resources to go to the poorest first (at least those able to work), it maximizes the insurance benefits to the poor, and it helps undermine some of the possibilities for their corruption on such schemes, and for their exploitation in labor markets and tenancy contracts. However, achieving these benefits with limited budgetary resources <u>must</u> entail a sufficiently low wage rate. There can be no presumption that higher wage rates without the necessary budgetary resources will be in the interests of the poor.

Notes

1. There is a large literature on the scheme, including Acharya and Panwalkar (1988), Basu (1981), Bhende et al., (1990), Dandekar and Sathe (1980), Dreze (1990), Echeverri-Gent (1988), Herring and Edwards (1983), and Lieberman (1985). More general discussions of the economics of this type of policy can be found in Besley and Coate (1990), Dreze and Sen (1990), Narayana et al., (1988), Ravallion (1990b), and World Bank (1990, Chapter 6).

2. The existing evidence is more conclusive on performance in screening poor from non-poor, than on transfer and stabilization benefits, recognizing that the latter are net of participants' forgone incomes, which are difficult to measure. See Ravallion (1990b) for a recent survey of the evidence on the scheme's performance in poverty alleviation.

3. Exceptions can arise if non-wage cost per worker is sufficiently high, or if a high value is placed on participants crossing the poverty line (rather than raising the lowest incomes). Ravallion (1990a) examines the theoretical case for and against wide coverage in a poverty alleviation scheme.

4. A Times of India News Service report from Pune, October 18, 1988, stated that: "Slums mushrooming on the periphery of several towns in Maharashtra's sugar belt indicate the large scale migration of landless laborers from the drought-hit areas in search of livelihood. The migration does not appear to be seasonal like the earlier ones, with the result that the slums may well develop into permanent settlements." The report identifies failure to find EGS work as the main cause.

5. Prior to this period, only limited data are available on a monthly basis. From April 1987, computerized records have been kept of person-days of employment and other variables, such as works in progress. Prior to this date, only an attendance count is available on a monthly basis. There were clear errors in a few observations, usually under-reported employment evident as extreme average wage rates; 15 of the 875 district/month observations in the data set (25 districts by 35 months) had to be deleted for this reason. Our aggregate series on EGS were built up from the district data, deleting these obvious errors.

6. For example, suppose (to simplify the exposition) that there are just two activities, "digging" and "shifting", with the rate for digging set above that for shifting. The relative wage is fixed (it did not change before and after May 1988), and we shall assume that the administrator cannot influence total employment. The value of output is $f(s,1-s)$ per unit of total employment, where s denotes the proportion of labor allocated to shifting which is paid at the rate W. (The production function is quasi-concave and homogeneous of degree one.) The surplus per unit of employment is then

$$f(s,1-s)-[s+(1-s)r]W$$

where $r > 1$ denotes the wage relativity (digging/shifting). The surplus is maximized when the difference in marginal social products between shifting and digging is equal to the difference in wage rates, $f_s - f_{1-s} = (1-r)W$, and it is readily verified that the surplus maximizing value of s is a strictly <u>increasing</u> function of W.

7. This is also observed between sub-periods 1 and 2, though this may partly reflect seasonality; we shall model seasonality explicitly in the next section.

8. From April 1987 to February 1990 the two variables are very highly correlated (r=.996 in levels, .989 in logs).

9. Data on labor attendance on EGS and the EGS time wage were obtained from the Planning Department, Government of Maharashtra.

10. Foodgrain output data disaggregated by <u>kharif</u> and <u>rabi</u> seasons are available only up to 1987-88. Since we are particularly interested in seeing how the model predicts labor attendances after mid-1988, we are unable to use the seasonally disaggregated data on foodgrain output.

11. Ideally, we would also like to include variables for the non-foodgrain output. We are however constrained by the non-availability of data for the last two years of our sample period. Foodgrains nevertheless still account for about 70 per cent of the gross cropped area in Maharashtra (GOM 1987, 1989).

12. The fact that we do not have a monthly series on the EGS wage rate means that there is measurement error in this variable, which will bias OLS estimates. We also estimated a generalized instrumental variables estimator, in which the EGS wage was not used as its own instrument. The instrumental variables included the average EGS wage rate of the previous year and the rank of the current year's EGS wage, as well as all other RHS variables. The IV estimator gave very similar results to Table 3, though with a slightly lower wage elasticity (0.15 rather than 0.20). In view of this, and the fact that we gain 11 degrees of freedom using the OLS estimator, we decided to stay with the latter.

13. The model parameters also contain a dummy variable for December 1977. We believe there is an error in the data for this month. Excluding that variable had little effect on other parameters, though it did yield significant non-normality of residuals, as indicated by the LM test.

14. As evident in Figure 1, the actual increase in the wage rate was staggered over June to September 1988, so starting the post-sample forecasting in July (rather than June) is reasonable. This also coincides with the beginning of the new crop-year.

15. 1988 was not, of course, the first instance when piece rates on EGS increased, though it was the largest increase. However, in the earlier cases we do not find any evidence of structural instability, as indicated by the evolution of recursive residuals since December 1978. Both the CUMSUM and CUMSUMSQ statistics (Brown et al., 1975) are well within the 95% confidence intervals.

16. We also estimated the following model over the entire period, so as to focus on any possible changes in the attendance-wage relationship in the post-sample period:

$$L_t = \underset{(4.458)}{4.73} + \underset{(22.14)}{0.8101}L_{t-1} - \underset{(2.786)}{0.2715}Q_t + \underset{(2.178)}{0.1866}(1-DPS_t)W_t + \underset{(0.973)}{0.0816}DPS_t.W_t$$

$$- \underset{(1.476)}{0.00066}t + \text{other terms as in equation (1)}$$

$R^2=0.95$; SEE=0.1115; Mean d.v.=13.0571; N=167
LM tests: AR(12)=0.704; RESET(1)=5.66; HETERO(1)=2.84; NORM(2)=1.273

where DPS is a dummy variable taking the value 1 for the post-sample period, and 0 otherwise. Thus, a significant positive relationship between attendances and the EGS wage tends to vanish in the post-sample period. This disappearance of the attendance-wage relation for a period when the wage itself increased appreciably is suggestive of there being some rationing of EGS employment.

17. For example, even in normal times it has been said that the scheme is less effective in reaching poor tribals in some districts, such as Thane.

18. Two types of forecasts can be made: (i) static ("one-step") forecasts, which are made one month ahead, and so are based on the actual values of the previous month's attendance count, as well as the observed current values of all other variables in the post-sample period, and (ii) dynamic forecasts, which do not assume that any attendance counts are known for the post-sample period; unlike static forecasts, they use the forecasted values of the previous month's attendances. The forecasts in Figure 2 are dynamic forecasts. These are our best estimates of the time series of attendances that one would have observed in the post-sample period if there had not been any change in the model determining employment. Unlike static forecasts, dynamic forecasts do not "build in" the effects of any employment rationing since the increase in the minimum wage rate.

19. All variables except the monthly dummies are in natural logs. The wages are in real terms. The consumer price index for agricultural laborers was used to deflate the nominal wages. The base date is April 1987.

20. These data are unpublished. They are available in the form of a fortnightly series of daily wages by gender for various agricultural operations for each of 75 monitoring points spread over rural Maharashtra. For our purposes, we have used the simple mean of all wage observations available for a given month as the estimate of the average wage rate for Maharashtra in that month.

21. The choice of these instruments can be justified within a partial adjustment framework (or error correction model) expressing the actual number of projects as a suitable function of its own lagged value and the current and lagged values of the desired number of projects, and where the latter is a function of the expected and unexpected components of the notional demand for EGS employment.

22. The Durbin-Watson test on the OLS residuals from the static regression of real agricultural wage rate against real EGS wage rate is .86.

23. The Engle-Granger methodology involves first testing for unit roots in each series, and then (if unit roots are indicated) testing for stationarity in the OLS residuals from the "static" regression in the levels of the two series. We used the augmented Dickey-Fuller tests proposed by Engle and Granger. Unit roots were indicated in both the EGS and agricultural wage series. The first difference of the residuals from the static regression was then regressed against its own lagged values (first and second order), and the lagged level of the residual. The t-ratio on the latter was 1.06, which is well below the critical value (for larger sample sizes) given in Engle and Granger (1987). The test was repeated using nominal wage rates, and with both real and nominal wage rates in log form. In no case could the null of no cointegration be rejected (t-ratios were all similar to the above figure). While it is recognized that these tests can lack power in small samples, the rejection of cointegration would still seem convincing.

References

Acharya, Sarthi and V.G. Panwalkar (1988): "The Maharashtra Employment Guarantee Scheme: Impacts on Male and Female Labour". Paper prepared for the Population Council Program on Women's Roles and Gender Differences.

Basu, Kaushik (1981): "Food for Work Programmes: Beyond Roads that Get Washed Away", Economic and Political Weekly 16:37-40.

Besley, Timothy and Stephen Coate (1990): "Workfare vs. Welfare: Incentive Arguments for Work Requirements in Poverty Alleviation Programs", mimeo, Woodrow Wilson School, Princeton University.

Bhende, M.J., T.S. Walker, S.S. Lieberman and J.V. Venkataram (1990): "The EGS and the Poor: Evidence from Longitudinal Village Studies", Processed, International Crops Research Institute for the Semi-Arid Tropics.

Brown, R.L., J.Durbin and J.M. Evans (1975): "Techniques for Testing the Constancy of Regression Relations over Time", Journal of the Royal Statistical Society B 37:149-92.

Dandekar, Kumudini and Manju Sathe (1980): "Employment Guarantee Scheme and Food for Work Programme". Economic and Political Weekly 15 (April 12): 707-713.

Dreze, Jean (1990): "Famine Prevention in India", in Jean Dreze and Amartya Sen (eds), The Political Economy of Hunger. Oxford: Oxford University Press, forthcoming.

Dreze, Jean and Amartya Sen (1990): Hunger and Public Action. Oxford: Oxford University Press.

Echeverri-Gent, John (1988): "Guaranteed Employment in an Indian State. The Maharashtra Experience". Asian Survey 28:1294-1310.

Engle, Robert F. and C.W.J. Granger (1987): "Co-Integration and Error Correction: Representation, Estimation and Testing". Econometrica 55:251-276.

Government of Maharashtra (GOM) (1984): Report of the Fact Finding Committee on Regional Imbalance in Maharashtra. Bombay: Planning Department, GOM.

____________________ (1987): Selected Indicators for Districts in Maharashtra and States of India 1984-85. Bombay: Directorate of Economics and Statistics, GOM.

____________________ (1989): Selected Indicators for Districts in Maharashtra and States of India 1986-87. Bombay: Directorate of Economics and Statistics, GOM.

Granger, Colin W. J. and Paul Newbold (1986): Forecasting Economic Time Series. Second Edition. San Diego: Academic Press.

Herring, Ronald J. and Rex M. Edwards (1983): "Guaranteeing Employment to the Rural Poor: Social Functions and Class Interests in Employment Guarantee Scheme in Western India". World Development 11: 575-592.

Lieberman, S. S. (1985): "Field-Level Perspectives on Maharashtra's Employment Guarantee Scheme". Public Administration and Development 5:109-127.

Narayana, N.S.S., K.S. Parikh, and T.N. Srinivasan (1988): "Rural Works Programs in India: Costs and Benefits". Journal of Development Economics 29:131-156.

Pesaran, M. Hashem, and Bahram Pesaran (1987): Microfit, An Interactive Econometric Software Package. Oxford: Oxford University Press.

Programme Evaluation Organization (PEO) (1980): Joint Evaluation Report on Employment Guarantee Scheme of Maharashtra. Planning Commission, Government of India, New Delhi.

Ravallion, Martin (1990a): "On the Coverage of Public Employment Schemes for Poverty Alleviation". Journal of Development Economics, forthcoming.

________________ (1990b): "Reaching the Poor through Rural Public Employment: A Survey of Theory and Evidence". Discussion Paper 94, World Bank, Washington DC. (Shortened version forthcoming in World Bank Research Observer.)

________________ (1990c): "Market Responses to Anti-Hunger Policies: Wages, Prices, and Employment". Forthcoming in Jean Dreze and Amartya Sen (eds) The Political Economy of Hunger. Oxford: Oxford University Press.

Subbarao, K. (1989): "Interventions to Combat Household-Level Food Insecurity: A Review of India's Experience", mimeo, World Bank.

World Bank (1989): India: Poverty, Employment and Social Services. A World Bank Country Study, Washington DC: World Bank.

__________ (1990): World Development Report 1990, Poverty. Washington DC: World Bank.

Table 1: Summary Data on EGS Before and After the Wage Increase.

	Sub-period: 1 April 87-May 88	2 June 88-November 88	3 December 88-February 90	Percentage change 1 to 3
Total cost ($Rp \times 10^6$/month, April 1987 prices)	132.6	123.6	105.3	-21
Of which:				
Wage cost	88.7	91.0	76.0	-14
Non-wage cost	43.9	32.6	29.2	-33
Employment (Person-days$\times 10^6$/month)	9.9	6.5	6.1	-38
Average wage rate (Rp/day, April 1987 prices).	9.0	15.1	12.4	37
Average non-wage cost per worker (Rp/day, April 1987 prices)	4.6	5.9	4.9	7

Table 2. A Decomposition of the Change in Operating Cost.

	Change in average monthly cost due to:	
$(m_3-m_1)k_1L_1/p_1$	increase in minimum nominal wage rate	89.0
$+(p_3-p_1)m_1k_1L_1/p_1^2$	increase in price level	-17.8
$+(k_3-k_1)m_1L_1/p_1$	change in work composition	-37.9
$+(X_3-X_1)L_1$	change in real unit non-wage cost	2.6
$+(L_3-L_1)V_1$	change in employment	-51.8
	residual (interaction effects)	-11.5
$=C_3-C_1$	change in real cost (Rpx10^6/month, April 1987 prices)	-27.3

Table 3: Parameter Estimates for the EGS Monthly Attendance Model, 1975-88

Explanatory variable	Parameter estimate (absolute t-ratio)
Intercept	4.907 (4.51)
L_{-1}	0.805 (22.25)
W	0.196 (2.30)
Q	-0.284 (2.93)
t	-0.001 (1.60)

Month	M_j	RE_j	RD_j
July	-0.116 (1.74)	-0.758 (1.86)	-0.572 (1.41)
August	-0.087 (2.06)	-0.406 (2.06)	–
September	–	-0.239 (3.05)	–
October	-0.163 (4.33)	–	–
November	–	–	-0.161 (2.64)
December	0.376 (5.39)	-0.075 (1.57)	-0.182 (2.01)
January	0.106 (1.77)	0.069 (1.13)	0.085 (1.02)
February	–	0.063 (2.01)	0.226 (3.96)
March	0.275 (4.82)	–	-0.206 (1.94)
April	0.071 (1.82)	–	–
May	0.113 (2.59)	-0.090 (1.65)	–
June	–	-0.301 (1.61)	–

R^2=0.923; SEE=0.1096; Mean d.v.=13.1286; N=155; Durbin h=0.445;
LM tests: AR(1)=0.0479 ; AR(12)=0.6761; RESET(1)=0.7574 ; NORM(2)=06949; HETERO(1)=2.638
Post-sample forecasting: $Chi^2_1(12)$=30.59; $Chi^2_2(12)$=67.33

Table 4: Estimated Employment Rationing on EGS After the Wage Increase

	Actual attendances	Unfulfilled demand
	('000 persons)	
July 1988	248.1	70.6
August 1988	147.7	151.7
September 1988	97.5	163.7
October 1988	79.3	168.4
November 1988	85.1	188.2
December 1988	130.1	283.2
January 1989	182.1	327.2
February 1990	238.9	385.0
March 1990	308.9	461.3
April 1990	342.5	401.6
May 1990	371.3	382.7
June 1990	322.5	357.7
Mean 1988/89	212.8	278.4

Table 5: Further Tests for Employment Rationing 1987-9.

Elasticity of EGS employment w.r.t.:		Estimation method 1 (OLS)	2 (IV)	3 (IV)
The number of works in progress (P)	b_5	1.094 (3.83)	1.243 (3.08)	1.136 (4.85)
The average EGS wage rate (W)	b_2	-.514 (2.30)	-.523 (2.32)	-.479 (2.92)
The average ag. wage rate (WA)	b_3	-.011 (.017)	.102 (.144)	n.a.

Note: Absolute t-ratios in parentheses, 31 monthly observations, R^2=.97 for 1,2 and 3. Regressions 1 and 2 included 11 monthly dummy variables and lagged dependent variable. Regression 3 excludes highly insignificant variables (including agricultural wage rate). All regressions passed LM tests for serial correlation, functional form, normality, and heteroscedasticity. See text for further details on the model.

Figure 1: EGS and Agricultural Wage Rates

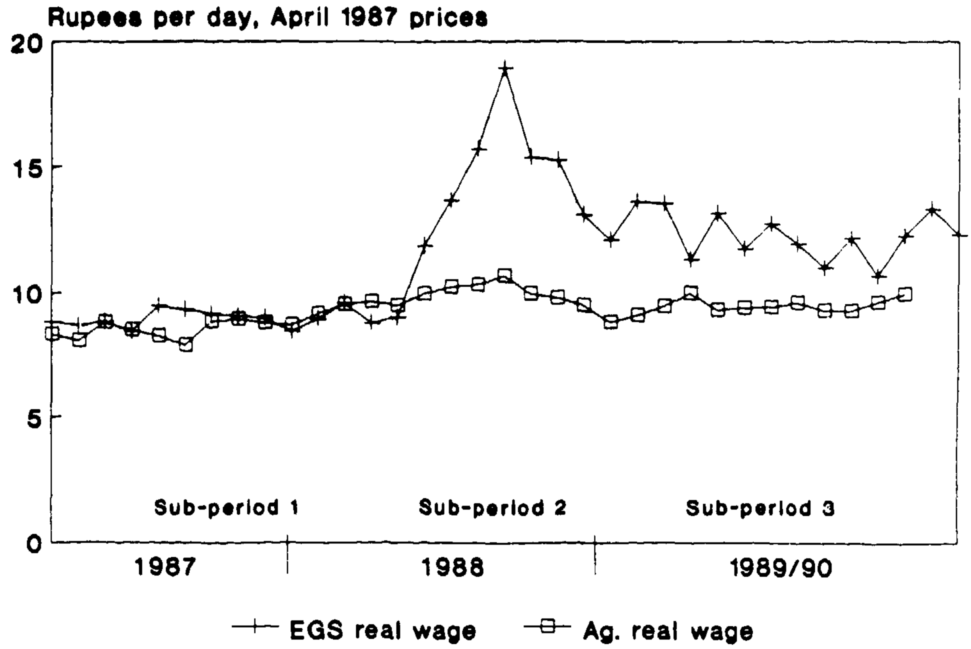
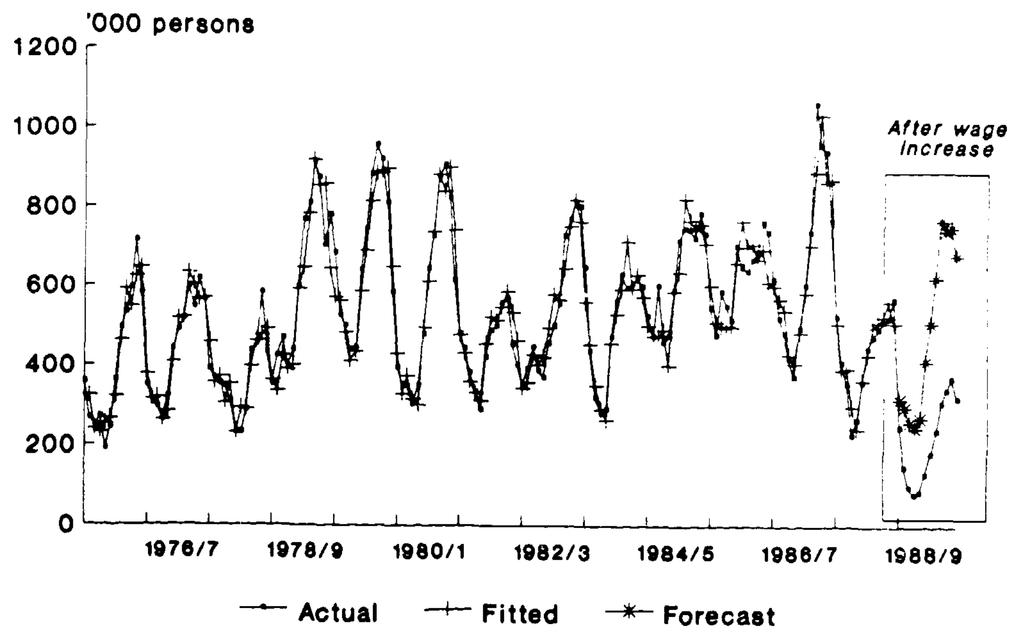


Figure 2: EGS Attendances by Month



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